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AUTHOR	Treagust, David F., Ed.; And Others
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ABSTRACT

The underlying theme of this book illustrates how constructivist ideas can be used by science and mathematics educators for research and the further improvement of educational practice. Authors from various parts of the world describe their work investigating students' conceptions, improving teaching and curricula, and enhancing teacher education in science and mathematics contexts. Chapters include: (1) "Overview: Research on Students' Preinstructional Conceptions-The Driving Force for Improving Teaching and Learning in Science and Mathematics" (David Treagust, Reinders Duit, and Barry Fraser); (2) "Investigating Student Understanding as a Prerequisite to Improving Teaching and Learning in Science and Mathematics" (Reinders Duit, David Treagust, and Helen Mansfield); (3) "Concept Mapping: A Tool for Improving Science Teaching and Learning" (Joseph Novak); (4) "Interviews About Instances and Interviews About Events" (Malcolm Carr); (5) "Computer-Video-Based Tasks for Assessing Understanding and Facilitating Learning in Geometrical Optics" (Fred Goldberg and Sharon Bendall); (6) "Using Teaching Experiments to Enhance Understanding of Students' Mathematics" (Leslie Steffe and Beatriz D'Ambrosio); (7) "Reorganizing the Curriculum and Teaching to Improve Learning in Science and Mathematics" (Reinders Duit and Jere Confrey); (8) "Curriculum Development as Research: A Constructivist Approach to Science Curriculum Development and Teaching" (Rosalind Driver and Philip Scott); (9) "Strategies for Remediating Learning Difficulties in Chemistry" (Ruth Ben-Zvi and Avi Hofstein); (10) "Using Student Conceptions of Parallel Lines to Plan a Teaching Program" (Helen Mansfield and John Happs); (11) "Teaching for Conceptual Change" (Peter Hewson); (12) "Contrastive Teaching: A Strategy to Promote Qualitative Conceptual Understanding of Science" (Horst Schecker and Hans Niedderer); (13) "Concept Substitution: A Strategy for Promoting Conceptual Change" (Diane Grayson); (14) "Changing the Curriculum to Improve Student Understandings of Function" (Jere Confrey and Helen Doerr); (15) "Analytical and Holistic Approaches to Research on Teacher Education" (Kenneth Tobin); (16) "Metacognitive Strategies in the Classroom" (John Baird and Richard White); (17) "A Constructivist Perspective on Science Teacher Education" (Jeff Northfield, Richard Gunstone, and Gaalen Erickson); (18) "Diagnosis of Teachers' Knowledge Bases and Teaching Roles When Implementing Constructivist Teaching/Learning Approaches" (Brian Hand); and (19) "Implementing Teacher Change at the School Level" (James Gallagher). (JRH)